2-24-1 Optimization and search heuristics

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For the purpose of the project we have implemented most of the algorithms seen during the first part of the course. In addition to the *RLS* and *(1+1)EA* that are already part of the bootstrap project we propose the *(μ+λ)EA*, the *(μ,λ)EA*, the *simulated annealing* and the *1+(λ,λ)GA*.

We also use an heuristic to identify useless object and delete them. You can find more information for this processing in INSERT REF.

We will discuss about the impact of the preprocessing, the optimal parameters λ and μ for each algorithm and we will compare the differents heuristics over different kind of instances.

TODO PRECISE CONFIG OF THE PC.

Contents

1 Preprocessing

We begin with a comparison of the effectiveness of the *RLS* with and without the preprocessing. This will give an insight of the utility of this method. We consider the dataset **fnl4461 n4460 bounded-strongly-corr 01**.

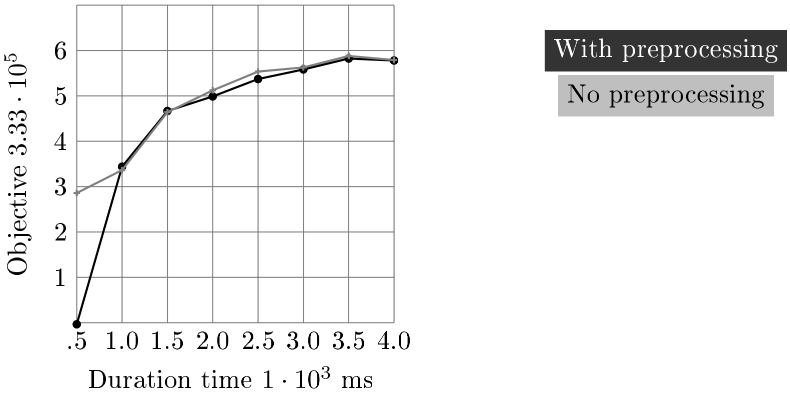

Figure 1: Effectiveness with and without preprocessing.

This suggests the preprocessing is not so usefull. In the following tests we will assume the preprocessing is desactivated.

2 Finding optimal parameters

We now search for optimal values for the parameters given to the *Evolutionary Algorithms*.

2.1 Parameters for the $(\mu+\lambda)$EA

We have computed results over the same dataset as before but with a time limit fixed to 2 seconds.

In the following table we give the objective value ($\cdot 10^3$) depending on λ (columns) and μ (rows).

	1	2	3	4	5	6	7	8
1	57.319	75.313	82.962	79.675	90.212	79.101	83.769	83.558
2	0.94	28.786	47.334	55.418	52.986	42.394	57.919	58.145
3	-47.932	-8.061	-0.737	13.734	34.343	24.937	25.238	30.463

We do not represent greater values of μ because they are worth.

We observe that definitively, the best value for μ is 1 and that λ can be taken around 5 or 6.

2.2 Parameters for the (μ,λ)EA

We still use the same dataset and the same time limit.

	6	7	8	9	10	11	12	13
1	83.061	76.424	79.828	90.550	84.161	89.578	86.279	80.184
2	57.759	67.847	67.239	64.593	60.688	64.267	72.076	67.081
3	15.680	40.752	48.155	58.068	57.982	59.098	59.939	55.429

For the two algorithm the impact of the values are similar (except when μ and λ are equals to 1).

We conclude optimal parameters are 1 for μ and around 10 for λ.

3 Comparisons between algorithms over different datasets

	strongly corr	uncorr/sim weights	uncorr/diff weights
RLS	15051.801937058	104363.6465698	411714.7895653
$(\mu+\lambda)$EA	15964.223206094	104364.48085275	406518.83992591
Sim. annealing	14574.51345331	104364.02100352	411714.7895653
$(\mu\lambda)$EA	12780.464683243	103668.17130203	405539.75820266
$1+(\lambda\lambda)$GA	15601.751609	104196.08949973	329082.5109551
Aléatoire	14430.524428273	103900.45630387	382653.85033683